

# CDO COLLEGE PREP CHEMISTRY FALL FINAL EXAM REVIEW

- 1) The density of silver is  $10.5 \text{ g/cm}^3$ . A piece of silver with a mass of  $61.3 \text{ g}$  would occupy a volume of \_\_\_\_\_  $\text{cm}^3$ .
  - a) 5.84
  - b) 0.171
  - c) 10.5
  - d) 0.00155
  - e) 644
  
- 2) A certain liquid has a density of  $2.67 \text{ g/cm}^3$ .  $1340 \text{ g}$  of this liquid would occupy a volume of \_\_\_\_\_ L.
  - a) 3.58
  - b)  $1.99 \times 10^{-3}$
  - c) 0.502
  - d) 50.2
  - e) 35.8
  
- 3) The number 0.00430 has \_\_\_\_\_ significant figures.
  - a) 2
  - b) 4
  - c) 5
  - d) 3
  - e) 6
  
- 4) A combination of sand, salt, and water is an example of a \_\_\_\_\_.
  - a) heterogeneous mixture
  - b) compound
  - c) homogeneous mixture
  - d) solid
  - e) pure substance
  
- 5) Which one of the following has the element name and symbol correctly matched?
  - a) B, bromine
  - b) Tn, tin
  - c) Fe, iron
  - d) S, sodium
  - e) N, neon
  
- 6) Which one of the following elements has a symbol that is not derived from its foreign name?
  - a) copper
  - b) tin
  - c) mercury
  - d) aluminum
  - e) lead
  
- 7) Which of the following liquids has the greatest density?
  - a)  $3.5 \text{ cm}^3$  with a mass of  $10 \text{ g}$
  - b)  $0.022 \text{ cm}^3$  with a mass of  $0.10 \text{ g}$
  - c)  $54 \text{ cm}^3$  with a mass of  $45 \text{ g}$
  - d)  $210 \text{ cm}^3$  with a mass of  $12 \text{ g}$
  - e)  $13 \text{ cm}^3$  with a mass of  $23 \text{ g}$
  
- 8) Which of the following has the same number of significant figures as the number 1.00310?
  - a)  $1 \times 10^6$
  - b) 100
  - c) 199.791
  - d) 5.119
  - e) 8.66
  
- 9) How many significant figures should be retained in the result of the following calculation?
 
$$12.00000 \times 0.9893 + 13.00335 \times 0.0107$$
  - a) 2
  - b) 3
  - c) 4
  - d) 5
  - e) 6
  
- 10) The correct answer (reported to the proper number of significant figures) to the following is \_\_\_\_\_.
 
$$11.5 \times 8.78 = \underline{\hspace{2cm}}$$

11) Round the following number to four significant figures and express the result in standard exponential notation: 229.613

- a)  $2.296 \times 10^{-2}$
- b)  $2.296 \times 10^2$
- c)  $22.96 \times 10^{-1}$
- d) 229.6
- e)  $0.2296 \times 10^3$

12) The atomic number indicates \_\_\_\_\_.

- a) the total number of neutrons and protons in a nucleus
- b) the number of different isotopes of an element
- c) the number of atoms in 1 g of an element
- d) the number of neutrons in a nucleus
- e) the number of protons or electrons in a neutral atom

13) The nucleus of an atom contains \_\_\_\_\_.

- a) protons and electrons
- b) protons and neutrons
- c) protons, neutrons, and electrons
- d) electrons
- e) protons

14) Elements in Group 8A are known as the \_\_\_\_\_.

- a) chalcogens
- b) halogens
- c) alkali metals
- d) alkaline earth metals
- e) noble gases

15) Elements in Group 7A are known as the \_\_\_\_\_.

- a) alkaline earth metals
- b) chalcogens
- c) alkali metals
- d) noble gases
- e) halogens

16) Which one of the following is often easily separated into its components by simple techniques such as filtering or decanting?

- a) solutions
- b) heterogeneous mixture
- c) homogeneous mixture
- d) compounds
- e) elements

17) Potassium is a \_\_\_\_\_ and chlorine is a \_\_\_\_\_.

- a) metal, metal
- b) metal, nonmetal
- c) metalloid, nonmetal
- d) metal, metalloid
- e) nonmetal, metal

18) What is the formula of the compound formed between strontium ions and nitrogen ions?

- a)  $\text{Sr}_3\text{N}_2$
- b)  $\text{SrN}_2$
- c)  $\text{SrN}$
- d)  $\text{SrN}_3$
- e)  $\text{Sr}_2\text{N}_3$

19) Sodium forms an ion with a charge of \_\_\_\_\_.

- a) 2+
- b) 2-
- c) 1-
- d) 1+
- e) 0

20) Calcium forms an ion with a charge of \_\_\_\_\_.

- a) 2+
- b) 1-
- c) 0
- d) 2-
- e) 1+

21) Iodine forms an ion with a charge of \_\_\_\_\_.

- a) 1+
- b) 1-
- c) 2+
- d) 2-
- e) 7-

22) All atoms of a given element have the same \_\_\_\_\_.

- a) number of neutrons
- b) number of electrons and neutrons
- c) number of protons
- d) mass
- e) density

23) Oxygen forms an ion with a charge of \_\_\_\_\_.

- a) 2+
- b) 3-
- c) 2-
- d) 3+
- e) 6+

24) The correct name for  $K_2S$  is \_\_\_\_\_.

- a) potassium sulfide
- b) potassium sulfate
- c) potassium disulfide
- d) potassium bisulfide
- e) dipotassium sulfate

25) Consider the following selected postulates of Dalton's atomic theory:

- (i) Each element is composed of extremely small particles called atoms.
- (ii) Atoms are indivisible.
- (iii) Atoms of a given element are identical.
- (iv) Atoms of different elements are different and have different properties.

Which of the postulates is(are) no longer considered valid?

- a) (i) and (ii)
- b) (iii) only
- c) (ii) and (iii)
- d) (iii) and (iv)
- e) (ii) only

26) The gold foil experiment performed in Rutherford's lab \_\_\_\_\_.

- a) led to the discovery of the atomic nucleus
- b) was the basis for Thomson's model of the atom
- c) proved the law of multiple proportions
- d) utilized the deflection of beta particles by gold foil
- e) confirmed the plum-pudding model of the atom

27) The correct name for  $Al_2O_3$  is \_\_\_\_\_.

- a) aluminum trioxide
- b) dialuminum oxide
- c) dialuminum trioxide
- d) aluminum hydroxide
- e) aluminum oxide

28) The correct name for  $CCl_4$  is \_\_\_\_\_.

- a) carbon chlorate
- b) carbon perchlorate
- c) carbon tetrachloride
- d) carbon tetrachlorate
- e) carbon chloride

29) The correct name for  $N_2O_5$  is \_\_\_\_\_.

- a) dinitrogen pentoxide
- b) nitrogen oxide
- c) nitrogen pentoxide
- d) nitrous oxide
- e) nitric oxide

30) There are \_\_\_\_\_ electrons, \_\_\_\_\_ protons, and \_\_\_\_\_ neutrons in an atom of  $^{132}_{54}\text{Xe}$ .

- a) 54, 54, 132
- b) 78, 78, 132
- c) 132, 132, 54
- d) 78, 78, 54
- e) 54, 54, 78

31) Which isotope has 45 neutrons?

- a)  $^{80}_{36}\text{Kr}$
- b)  $^{34}_{17}\text{Cl}$
- c)  $^{78}_{34}\text{Se}$
- d)  $^{80}_{35}\text{Br}$
- e)  $^{103}_{45}\text{Rh}$

32) The nucleus of an atom does not contain \_\_\_\_\_.

- a) protons or neutrons
- b) electrons
- c) subatomic particles
- d) neutrons
- e) protons

33) Different isotopes of a particular element contain different numbers of \_\_\_\_\_.

- a) protons
- b) protons and neutrons
- c) neutrons
- d) protons, neutrons, and electrons
- e) None of the above is correct.

34) Different isotopes of a particular element contain the same number of \_\_\_\_\_.

- a) protons, neutrons, and electrons
- b) protons
- c) subatomic particles
- d) neutrons
- e) protons and neutrons

35) What is the wavelength of light (nm) that has a frequency of  $3.22 \times 10^{14} \text{ s}^{-1}$ ?

- a) 649
- b)  $9.32 \times 10^{-7}$
- c) 932
- d)  $1.07 \times 10^6$
- e)  $9.66 \times 10^{22}$

36) Which one of the following does not occur as diatomic molecules in elemental form?

- a) hydrogen
- b) bromine
- c) nitrogen
- d) oxygen
- e) sulfur

37) Of the choices below, which one is not an ionic compound?

- a)  $\text{PCl}_5$
- b)  $\text{NaCl}$
- c)  $\text{PbCl}_2$
- d)  $\text{MoCl}_6$
- e)  $\text{RbCl}$

38) The correct formula of iron(III) bromide is \_\_\_\_\_.

- a)  $\text{Fe}_3\text{Br}_3$
- b)  $\text{Fe}_3\text{Br}$
- c)  $\text{FeBr}_2$
- d)  $\text{FeBr}_3$
- e)  $\text{FeBr}$

39) Which of the following compounds would you expect to be ionic?

- a)  $\text{H}_2\text{O}$
- b)  $\text{CaO}$
- c)  $\text{NH}_3$
- d)  $\text{H}_2\text{O}_2$
- e)  $\text{SF}_6$

40) What is the frequency ( $\text{s}^{-1}$ ) of electromagnetic radiation that has a wavelength of 0.53 m?

- a)  $1.3 \times 10^{-33}$
- b)  $5.7 \times 10^8$
- c)  $1.3 \times 10^{33}$
- d)  $1.8 \times 10^{-9}$
- e)  $1.6 \times 10^8$

41) Of the following, \_\_\_\_\_ radiation has the longest wavelength and \_\_\_\_\_ radiation has the greatest energy.

gamma      ultraviolet      visible

- a) ultraviolet, gamma
- b) gamma, visible
- c) gamma, gamma
- d) visible, gamma
- e) visible, ultraviolet

42) There are \_\_\_\_\_ orbitals in the third shell.

- a) 4
- b) 9
- c) 16
- d) 25
- e) 1

43) The \_\_\_\_\_ subshell contains only one orbital.

- a) 1p
- b) 4s
- c) 6f
- d) 3d
- e) 5d

44) The electron configuration of a ground-state Ag atom is \_\_\_\_\_.

- a)  $[\text{Kr}]5s^14d^{10}$
- b)  $[\text{Ar}]4s^24d^9$
- c)  $[\text{Kr}]5s^23d^9$
- d)  $[\text{Kr}]5s^24d^{10}$
- e)  $[\text{Ar}]4s^14d^{10}$

45) The ion  $\text{NO}^-$  has \_\_\_\_\_ valence electrons.

- a) 15
- b) 14
- c) 10
- d) 12
- e) 16

46) The ground state electron configuration for Zn is \_\_\_\_\_.

- a)  $[\text{Ar}]4s^13d^{10}$
- b)  $[\text{Kr}]3s^23d^{10}$
- c)  $[\text{Ar}]4s^23d^{10}$
- d)  $[\text{Kr}]4s^23d^{10}$
- e)  $[\text{Ar}]3s^23d^{10}$

47) The ground state electron configuration of Fe is \_\_\_\_\_.

- a)  $1s^22s^22p^63s^23p^64s^24d^6$
- b)  $1s^22s^23s^23p^{10}$
- c)  $1s^22s^23s^23p^63d^6$
- d)  $1s^22s^22p^63s^23p^64s^2$
- e)  $1s^22s^22p^63s^23p^64s^23d^6$

48) The ground state configuration of fluorine is \_\_\_\_\_.

- a)  $[\text{He}]2s^22p^4$
- b)  $[\text{He}]2s^22p^5$
- c)  $[\text{He}]2s^22p^6$
- d)  $[\text{He}]2s^22p^3$
- e)  $[\text{He}]2s^22p^2$

49) The only noble gas without eight valence electrons is \_\_\_\_\_.

- a) Ar
- b) Kr
- c) Ne
- d) He
- e) All noble gases have eight valence electrons.

50) A TRIPLE bond consists of \_\_\_\_\_ pairs of electrons shared between two atoms.

- a) 1
- b) 2
- c) 3
- d) 4
- e) 6

51) The Lewis structure of  $\text{PF}_3$  shows that the central phosphorus atom has \_\_\_\_\_ nonbonding and \_\_\_\_\_ bonding electron pairs.

- a) 1, 3
- b) 3, 1
- c) 1, 2
- d) 3, 3
- e) 2, 2

52) How many equivalent resonance forms can be drawn for  $\text{SO}_2$  without expanding octet on the sulfur atom (sulfur is the central atom)?

- a) 0
- b) 1
- c) 4
- d) 2
- e) 3

53) How many equivalent resonance structures can be drawn for the molecule of  $\text{SO}_3$  without having to violate the octet rule on the sulfur atom?

- a) 3
- b) 2
- c) 4
- d) 5
- e) 1

54) Of the molecules below, the bond in \_\_\_\_\_ is the most polar.

- a) HF
- b) HBr
- c)  $\text{H}_2$
- d) HI
- e) HCl

55) Resonance structures differ by \_\_\_\_\_.

- a) placement of atoms only
- b) number and placement of electrons
- c) placement of electrons only
- d) number of electrons only
- e) number of atoms only

56) According to VSEPR theory, if there are THREE electron domains in the valence shell of an atom, they will be arranged in a(n) \_\_\_\_\_ geometry.

- a) trigonal planar
- b) octahedral
- c) trigonal bipyramidal
- d) linear
- e) tetrahedral

57) The molecular geometry of the  $\text{CHCl}_3$  molecule is \_\_\_\_\_.

- a) tetrahedral
- b) trigonal planar
- c) T-shaped
- d) bent
- e) trigonal pyramidal

58) The molecular geometry of the  $\text{SF}_2$  molecule is \_\_\_\_\_.

- a) trigonal planar
- b) octahedral
- c) bent
- d) linear
- e) tetrahedral

59) When a liquid is converted to a solid the process is known as:

- a) freezing
- b) boiling
- c) condensation
- d) evaporation

60) Under standard conditions sodium is a \_\_\_\_\_ and bromine is a \_\_\_\_\_.

- a) solid, liquid
- b) liquid, solid
- c) solid, solid
- d) solid, solid

61) Of the following substances, only \_\_\_\_\_ has London dispersion forces as the only intermolecular force.

- a)  $\text{CH}_3\text{OH}$
- b) HCl
- c)  $\text{H}_2\text{S}$
- d) Kr
- e)  $\text{NH}_3$

62) Which one of the following exhibits dipole-dipole attraction between molecules?

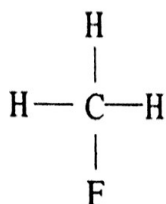
- a)  $\text{AsH}_3$
- b)  $\text{CO}_2$
- c)  $\text{BCl}_3$
- d)  $\text{XeF}_4$
- e)  $\text{Cl}_2$

63) A 22.5-g sample of ammonium carbonate contains \_\_\_\_\_ mol of ammonium ions.

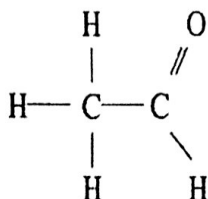
- a) 2.14
- b) 3.47
- c) 0.468
- d) 0.234
- e) 0.288

64) Which one of the following substances will have hydrogen bonding as one of its intermolecular forces?

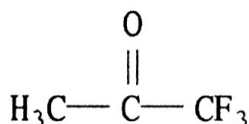
a)



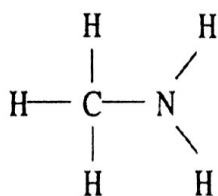
b)



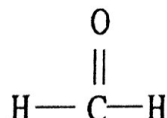
c)



d)



e)



65) What is the mass % of carbon in dimethylsulfoxide ( $\text{C}_2\text{H}_6\text{SO}$ ) rounded to three significant figures?

- a) 60.0
- b) 20.6
- c) 7.74
- d) 79.8
- e) 30.7

66) How many moles of carbon dioxide are there in 52.06 g of carbon dioxide?

- a) 1.183
- b) 0.8452
- c)  $6.022 \times 10^{23}$
- d)  $3.134 \times 10^{25}$
- e)  $8.648 \times 10^{23}$

67) There are \_\_\_\_\_ molecules of methane in 0.123 mol of methane ( $\text{CH}_4$ ).

- a)  $2.04 \times 10^{-25}$
- b) 0.615
- c)  $2.46 \times 10^{-2}$
- d) 5
- e)  $7.40 \times 10^{22}$

68) What is the empirical formula of a compound that contains 27.0% S, 13.4% O, and 59.6% Cl by mass?

- a)  $\text{S}_2\text{OCl}$
- b)  $\text{SO}_2\text{Cl}$
- c)  $\text{ClSO}_4$
- d)  $\text{SOCl}_2$
- e)  $\text{SOCl}$

69) A compound contains 40.0% C, 6.71% H, and 53.29% O by mass. The molecular weight of the compound is 60.05 amu. The molecular formula of this compound is \_\_\_\_\_.

- a)  $\text{C}_2\text{H}_4\text{O}_2$
- b)  $\text{CHO}_2$
- c)  $\text{C}_2\text{H}_2\text{O}_4$
- d)  $\text{CH}_2\text{O}$
- e)  $\text{C}_2\text{H}_3\text{O}_4$

70) The mass % of H in methane ( $\text{CH}_4$ ) is \_\_\_\_\_.

- a) 4.032
- b) 74.87
- c) 92.26
- d) 7.743
- e) 25.13